EPA-450/3-85-020

Kraft Pulp Mills — Background Information for Promulgated Revisions to Standards

Emission Standards and Engineering Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

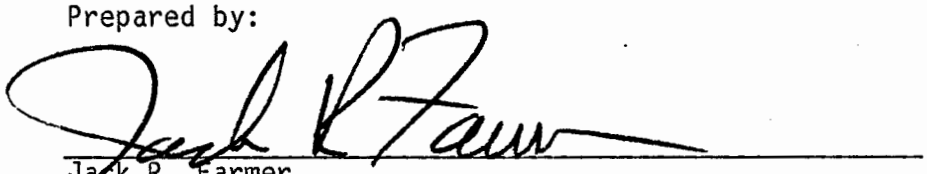
May 1986

This report has been reviewed by the Emission Standards and Engineering Division of the Office of Air Quality Planning and Standards, EPA, and approved for publication. Mention of trade names or commercial products is not intended to constitute endorsement or recommendation for use. Copies of this report are available through the Library Services Office (MD-35), U.S. Environmental Protection Agency, Research Triangle Park, N.C. 27711, or from National Technical Information Services, 5285 Port Royal Road, Springfield, Virginia 22161.

ENVIRONMENTAL PROTECTION AGENCY

Background Information and Final Environmental Impact Statement
for Promulgated Revisions to Standards
- Kraft Pulp Mills -

Prepared by:



5/13/86
Date

Jack R. Farmer
Director, Emission Standards and Engineering Division
U.S. Environmental Protection Agency (MD-13)
Research Triangle Park, North Carolina 27711

1. The promulgated standards of performance will limit emissions of particulate matter and total reduced sulfur (TRS) from new, modified, and reconstructed kraft pulp mills. Section 111 of the Clean Air Act (42 U.S.C. 7411), as amended, directs the Administrator to establish standards of performance for any category of new stationary source of air pollution that ". . . causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare."

2. Copies of this document have been sent to the following Federal Departments: Labor, Health, and Human Services, Agriculture, Commerce, Interior, and Energy; the National Science Foundation; the Council on Environmental Quality; State and Territorial Air Pollution Program Administrators; EPA Regional Administrators; Local Air Pollution Control Officials; Office of Management and Budget; and other interested parties.

3. For additional information contact:

Mr. Doug Bell
Standards Development Branch
Emission Standards and Engineering Division (MD-13)
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711
Telephone: (919) 541-5578

4. Copies of this document may be obtained from:

U.S. Environmental Protection Agency Library (MD-35)
Research Triangle Park, North Carolina 27711
Telephone: (919) 541-2777

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

LIST OF TABLES

Volume II BID for Kraft Pulp Mills

TABLE OF CONTENTS

1. SUMMARY

On January 19, 1984, the Environmental Protection Agency (EPA) proposed revisions to the standards of performance for kraft pulp mills (49 FR 2448) under authority of Section 111 of the Clean Air Act. Public comments were requested on the proposal in the Federal Register. There were 19 commenters composed mainly of industry representatives. Also commenting were two regulatory agencies. The comments that were submitted, along with responses to these comments, are summarized in this document. The summary of comments and responses serves as the basis for the revisions made to the standard between proposal and promulgation.

1.1 SUMMARY OF CHANGES SINCE PROPOSAL

Since proposal, the Agency has reviewed new information and now concludes that it is appropriate to exempt diffusion washers from the total reduced sulfur (TRS) standard for brown stock washer systems. Uncontrolled TRS emissions from diffusion washers are less than 0.001 lb TRS per ton of air-dried pulp (lb TRS/TADP). This level is orders of magnitude less than that of uncontrolled vacuum drum washers (0.3 lb TRS/TADP) and is also many times lower than the mass equivalent of the NSPS. The equivalent mass emission rate for the 5 ppm NSPS, based on the vacuum drum washer, is about 0.09 lb TRS/TADP. Because of the low mass of TRS emissions controlled and the low air volumes treated, requiring control of TRS emissions from diffusion washers to the 5 ppm TRS level would result in a cost effectiveness (C/E) in the range of $240,000 per ton of TRS removed. Therefore, the Agency has determined that requiring diffusion washers to meet the 5 ppm TRS standard would be unreasonable.

1.2 SUMMARY OF IMPACTS OF PROMULGATED ACTION

1.2.1 Alternatives to Promulgated Action

The regulatory alternatives are discussed in Chapter 6 of the Background Information Document (BID) for the proposed standards. These regulatory alternatives reflect the different levels of emission control from which one is selected that represents the best demonstrated technology, considering costs, nonair quality health, and environmental and economic impacts for kraft pulp mills. These alternatives remain the same.

1.2.2 Environmental, Economic, and Energy Impacts of Promulgated Action

Environment impacts are summarized in Chapter 9 of the BID. The decision to exempt diffusion washers from the new source performance standards (NSPS) for brown stock washers will cause no increase in TRS emissions because uncontrolled mass emissions of TRS from diffusion washers are orders of magnitude less than controlled emissions of TRS from vacuum washer systems. With the change noted in this section, the analysis of environmental impact in Volume I of the BID now becomes the final Environmental Impact Statement of the promulgated revision of the standards.

Economic impacts are summarized in Chapters 1 and 9 of the BID. The cost of controlling TRS emissions from diffusion washers was previously estimated to be $900 per ton of TRS removed. Estimated control costs, which take into consideration new information on actual mass emissions, are now estimated to range as high as $240,000 per ton of TRS removed. Such costs far exceed control costs for typical NSPS.

Exemption of diffusion washers from NSPS may produce a minor reduction in commitment of scarce resources such as chromium. Incineration of the somewhat corrosive vent gases requires that materials of construction such as stainless steel be used to construct ductwork to convey the gases

to a point of incineration. The costs of these materials and the low volume of gases are the major contributors to the high control costs cited above.

Since the uncontrolled TRS emissions from diffusion washers are lower than those from controlled vacuum drum washers, no adverse urban or community impacts will occur due to the exemption of diffusion washers from the TRS standard.

2. Summary of Public Comments

A total of 28 letters commenting on the proposed revisions to the NSPS for kraft pulp mills were received. A public hearing on the proposed standards was not held because one was not requested. A list of commenters, their affiliations, and the EPA docket number assigned to their correspondence is given in Table 2-1.

For the purpose of orderly presentation, the comments have been categorized under the following topics:

1. Selection of Emission Sources for Control
2. Emission Control Technology
3. Selection of Emission Limits
4. Test Methods and Monitoring
5. Reporting and Recordkeeping
6. Miscellaneous

The comments, the issues they address, and EPA's responses are discussed in the following sections of this chapter. Changes to the regulations are summarized in Subsection 1.2 of Chapter 1.

TABLE 2-1 LIST OF COMMENTERS ON PROPOSED STANDARDS OF PERFORMANCE FOR KRAFT PULP MILLS

Docket Item No.[a]	Commenter and Affiliation
IV-D-1, 2, 10 and 12	Dr. John Pinkerton National Council of the Paper Industry for Air and Stream Improvement (NCASI) 260 Madison Avenue New York, NY 10016
IV-D-3, 14, 20, 21, 24, and 26	Mr. Russell Blosser NCASI 260 Madison Avenue New York, NY 10016
IV-D-4	Mr. Donald Arkell Lane Regional Air Pollution Authority 1244 Walnut Street Eugene, OR 97403
IV-D-5	Mr. David Pattee International Paper Company International Paper Plaza 77 West 45th Street New York, NY 10036
IV-D-6	Mr. A. D. Whitford Longview Fibre Company Longview, WA 98632
IV-D-7	Mr. Dan Sjolseth Weyerhaeuser Company Tacoma, WA 98477
IV-D-8	Dr. John Festa American Paper Institute 1619 Massachusetts Avenue, NW Washington, DC 20036
IV-D-9	Mr. Michael Roberts Boise Cascade Corporation 1600 S.W. 4th Avenue P.O. Box 1414 Portland, OR 97207
IV-D-11	Mr. Harry Hovey, Jr. New York State Department of Environmental Conservation 50 Wolf Road Albany, NY 12233-0001
IV-D-13	Mr. R. F. Cashen St. Regis Paper Company Gulf Life Tower Jacksonville, FL 32207

Docket Item No.[a]	Commenter and Affiliation
IV-D-15	Mr. Joe G. Land, Jr. International Paper Company P.O. Box 999 Mansfield, LA 71052
IV-D-16	Mr. John S. Carter Georgia-Pacific Corporation 133 Peachtree Street, NE P.O. Box 105605 Atlanta, GA 30348
IV-D-17	Mr. T. O. Andrews Hammermill Paper Company 1540 East Lake Road Erie, PA 16533
IV-D-18	Mr. Dennis Ross Boise Cascade Corporation P.O. Box 500 Wallula, WA 99363
IV-D-19	Mr. Q. A. Narum Simpson Paper Company P.O. Box 637 Anderson, CA 96007
IV-D-23	Mr. Alan Lindsey International Paper Company International Paper Plaza 77 West 45th Street New York, NY 10036
IV-D-25	Mr. Frank B. McGinley Tennessee River Pulp and Paper Company P.O. Box 33 Counce, TN 38326
IV-D-27	Mr. Larry Pattengill International Paper Company P.O. Box 999 Mansfield, LA 71052
IV-D-28	Mr. J. L. Zuncich Federal Paper Board Company, Inc. Riegelwood, NC 28456

[a]The docket number for this project is OAQPS A-82-36. Dockets are on file at EPA Headquarters in Washington, D.C., and at the Office of Air Quality Planning and Standards in Durham, N.C.

2.1 SELECTION OF EMISSION SOURCES FOR CONTROL

2.1.1 Recovery Furnace Systems

Comment (IV-D-4). One commenter suggested that further consideration be given to requiring SO_2 controls on recovery furnaces. The commenter does not consider the estimated control cost of $3,000 per ton to be atypical for NSPS controls.

Response: The EPA is not aware of any instance in which flue gas desulfurization (FGD) has been installed to control sulfur dioxide (SO_2) emissions from a recovery furnace. Thus, there is no data base available upon which accurate estimates of costs and performance can be made. The estimated cost of $3,000 per ton of SO_2 removed presented in the preamble was derived from control cost information for industrial boiler FGD systems. Although the SO_2 control methodology which was examined is applicable to recovery furnaces, any cost projections which have been calculated are subject to the uncertainty inherent to the transfer of technology from one industry to another. Since the estimated cost per ton of SO_2 is in the uppermost range of control costs for NSPS and, since there is now uncertainty as to the true value of that cost, the Agency cannot conclude that there is a best demonstrated technology, considering cost, which would be applicable for SO_2 control at all new recovery boilers.

2.1.2 Black Liquor Oxidation (BLO) Systems

Comment (IV-D-5 and 8): Two commenters support the exemption of BLO Systems from TRS controls.

Response: None required.

Comment (IV-D-4 and 11): Two commenters oppose exemption of BLO systems from TRS controls. Both state that the possible 42 percent

increase in total TRS emissions from an individual facility can create unacceptable problems for a community and cannot be considered a minor change. Both commenters also state that control technology is available and should be required in spite of being somewhat expensive.

Response: As was discussed in the proposed revision (49 FR 2451-2), the estimated control cost of $9,200 per ton of TRS is unreasonable for a national standard. In the instance to which the commenters referred, the possible increase in emissions is substantial (42 percent) in comparison with total controlled TRS emissions and could conceivably create unacceptable odor problems for individual communities. For example, if a new facility is located at a site in close proximity to older, less effectively controlled facilities, the overall impact of a new uncontrolled BLO system may be unacceptable. In such instances, State and local agencies do have the authority and prerogative of establishing standards more stringent than NSPS.

2.2 EMISSION CONTROL TECHNOLOGY

2.2.1 Brown Stock Washers

2.2.1.1 Vacuum Drum Washers

Comment (IV-D-4 and 11): One commenter objected to continued provisions for exemption from incineration requirements for vacuum washers when excessive control costs can be demonstrated. They state that poor mill design, which requires that vacuum washers be installed some distance from an incineration device, is not reasonable cause for an exemption from control requirements. A second commenter said that emissions from diffusion washers may meet the standards without a control device and that EPA should carefully review any requests for vacuum washers where

diffusion washers could be installed.

Response: The provision for exemption from incineration requirements in the existing regulations is being kept because of difficulties which may arise when new vacuum drum washers are installed in existing facilities. The design of some existing recovery furnaces is such that the high volumes of gas given off by vacuum washer systems cannot be introduced to those furnaces without creating the potential for explosions to occur. In some cases existing plant layouts may preclude the installation of additional washer systems in an area near the recovery furnaces or power boilers. Without the exemption, ductwork lengths at existing mills could range up to 1,500 feet in length. Because the gases given off by vacuum washers have a high moisture content and contain sodium salts, such ductwork costs must include provision for corrosion-resistant materials of construction, with attendant high costs. A guideline document published by EPA in 1979 for control of TRS emissions at existing kraft pulp mills estimated costs for controlling brown stock washers at four times higher than control costs for new mills. These control costs for existing washer systems were considered unreasonable at that time and no emission guideline was recommended. Updated control costs for existing washers would be about $10,000/ton of TRS, which is considered unreasonable for this national standard.

With regard to diffusion washers, the Agency agrees with the second commenter. Elsewhere in this document, emissions from diffusion washer systems are discussed in detail and a conclusion is reached that these systems typically have very low mass emissions of TRS compared to vacuum drum systems. Therefore, EPA will carefully review requests for exemptions from NSPS for vacuum drum washers to insure that available alternatives

have been explored and to ascertain that an exemption is necessary.

Comment: (IV-D-2, 8, 10 and 17): Three different commenters support retention of the existing provisions for exemption from incineration requirements for new or modified brown stock washer systems on a case-by-case basis.

Response: None required.

2.2.1.2 Diffusion Washers

Comment (IV-D-1, 4, 5, 8, 10, and 11): Two comments contain the findings and resulting recommendations of a study performed by an industry council to quantify TRS emissions from diffusion washers. That study examined 9 diffusion washer vents and the mean mass emission rate was found to be 0.001 lb., or less, TRS/TADP. Such emission levels are two orders of magnitude less than those from uncontrolled vacuum drum washer systems. Using the same cost estimating procedures employed by EPA for the case of vacuum drum washer systems, the industry calculated the C/E of further controlling these emissions to be $240,000 per ton of TRS removed. Three commenters said that those findings preclude EPA from reasonably supporting the need to control diffusion washer vent gases on an emission significance or economic basis. They note that there would be no advantage to setting mass emission limits and that imposing measurement and reporting requirements would be burdensome. Two commenters support the above findings and conclusions. One commenter noted that diffusion washers may meet the existing standards without a control device.

One commenter disagrees with the others and says that diffusion washers should not be exempted outright from having TRS controls. This commenter believes each individual source should be required to demonstrate

that emissions from its uncontrolled diffusion washers can meet the same TRS standards as controlled vacuum washers.

Response: The study submitted on TRS emissions from diffusion washers has been reviewed by the Agency. The Agency agrees that uncontrolled TRS emissions from diffusion washers are less than 0.001 lb TRS/TADP. This level is orders of magnitude less than that of uncontrolled vacuum drum washers (0.3 lb TRS/TADP) and is also many times lower than the mass equivalent of the NSPS. The equivalent mass emission rate for the 5 ppm NSPS, based on the vacuum drum washer, is about 0.09 lb TRS/TADP. Because of the low mass of TRS emissions controlled and the low air volumes treated, requiring control of TRS emissions from diffusion washers to the 5 ppm TRS level would result in a C/E in the range of $240,000 per ton of TRS removed. Therefore, the Agency has determined that requiring diffusion washers to meet the 5 ppm TRS standard would be unreasonable.

For several reasons, revision of the NSPS to a mass equivalent TRS standard would also be unreasonable. As the available data indicated, uncontrolled TRS emissions from diffusion washers are many times lower than the mass equivalent of the NSPS. As such, requiring diffusion washers to demonstrate compliance with a mass equivalent NSPS would impose unnecessary costs for testing and reporting requirements. In addition, an EPA reference sampling method would have to be developed and promulgated since the present EPA Reference Method 1 is insufficient for sampling the low velocity, low volume, and cyclic gas stream emitted from a diffusion washer.

Development of a separate standard for TRS emissions from diffusion washers would require a major commitment of Agency resources to study a process which produces very low mass emissions. Such a standard would have to include a control technology which, in this case, would undoubtedly be incineration and the cost has been estimated to be in the range $240,000 per ton of TRS removed. Because projected control costs are high and potential benefits are negligible, the Agency has concluded that development of NSPS for TRS emissions from diffusion washers is not appropriate.

2.2.2 Recovery Furnace Systems

2.2.2.1 Noncontact Recovery Furnaces with Wet-Bottom Electrostatic Precipitators (ESP's)

Comment (IV-D-3, 4, 5, 8, 10, 11, 16, 17 and 21): Seven different commenters agreed with the EPA proposal to delay completion of the review of the existing TRS standards for recovery furnace systems as they pertain to facilities which have installed wet-bottom ESP's. All agreed that any possible changes which would take into consideration the performance of noncontact recovery furnaces equipped with wet-bottom ESP's using unoxidized black liquor should be delayed until the National Council of the Paper Industry for Air and Stream Improvement (NCASI) has completed its studies of these systems. One commenter noted that it has been demonstrated that dry-bottom ESP's can achieve the existing TRS standard. They conclude that any changes to the current TRS standard should pertain only to wet-bottom ESP's and that any possible changes should be delayed only until the NCASI study is complete. One commenter said that EPA should resist any change in the existing standards and that EPA should explore the use of non-TRS bearing water in the wet-bottom ESP's.

Response: Since proposal, much work has been done by NCASI and by individual affected firms in an attempt to fully understand and correct the problem. The NCASI study has identified several factors which are contributing to the problem. These include inlet baffling design, liquor temperature, liquor level, degree of agitation, and liquor chemistry. To date, modifications to mitigate the first four factors have been made in most instances where they appeared feasible. The results of the modifications differed from mill to mill and were not always successful for reducing TRS emissions. Similarly, efforts by individual mills to control or modify the chemistry of liquors used in the wet ESP's have given mixed results. After making various combinations of modifications, some facilities have achieved, or have come very close to achieving, the 5 ppmv TRS standard. However, according to industry assessments, several furnaces appear unable to consistently achieve better than 15 ppm and some appear unable to consistently achieve better than 25 ppm while using unoxidized black liquor in the ESP.

The EPA has reviewed available data and the steps which industry have taken. It is clear from this that NCASI and individual firms have expended considerable resources in their attempts to identify and correct the causes of TRS release from unoxidized black liquor used in wet-bottom ESP's. The Agency agrees that the recovery furnace TRS standard is probably not consistently achievable at all sources when such liquor is used in the ESP's. However, based on its review of the industry studies, the factors which are causing excess emissions, and of potential remedies, EPA has concluded that the standard for recovery furnace TRS emissions should not be revised. In reaching this conclusion, the Agency recognizes that the decisions to install the wet-bottom precipitators were made

based on the available industry data which indicated that the TRS emission limit would not be violated. But, there were other options available and those options were employed at other facilities. Furthermore, retrofit options are available which will allow the sources with wet-bottom ESP's to achieve compliance with the TRS emission limit. For example, two mills have made piping changes which allow them to use fresh water in wet-bottom ESP's and the level of the NSPS for TRS has been achieved. In addition, mills have the option of converting the bottoms of their ESP's from the wet to the dry design. Although each of these options entails a retrofit with annualized costs ranging from $85,000 to $275,000 per mill and the associated TRS reduction could be small, EPA believes the costs of the retrofits are reasonable. When the annualized cost of installing and retrofitting a wet-bottom ESP are compared to the annualized costs of initially installing a dry-bottom ESP, the net difference in estimated annualized costs of retrofitting the wet-bottom ESP are reasonable and range from a savings of $40,000 to a cost of $100,000.

In conclusion, therefore, the Agency believes that changes to the NSPS for kraft recovery furnaces would be inappropriate and that those mills now out of compliance with the TRS standard should take the necessary steps to achieve compliance in a timely manner.

2.2.2.2 Degradation of Performance of ESP's

Comment (IV-D-8, 10, and 13): Three commenters disagree with the Agency's conclusion in the BID that data from a 9 year old ESP show that ESP's can

reduce recovery furnace particulate emissions to NSPS levels over a long period of time when they are properly maintained. One commenter operates the ESP to which the three referred and this commenter says the data show that, even with maintenance, the ESP is not capable of achieving NSPS consistently. The commenter also said that it is inappropriate to draw conclusions about long-term performance of ESP's from data obtained from only one ESP.

A second commenter said that the data provided by the previous commenter clearly show an upward trend in emissions of PM with increasing age of the ESP and that EPA's judgment concerning the ability of ESP's to meet NSPS for particulate emissions over the long term is an inappropriate interpretation of data from a single location. The commenter presented long-term data from two other sources with ESP's designed to achieve emission levels similar to NSPS and said the data from all three sources showed an upward trend in particulate emissions with increasing age of the ESP's. The data from all three ESP's also showed that measured emissions following major rebuilds of the ESP's were significantly higher than those achieved when the precipitators were new. The commenter attributed the increased emissions to such factors as buildups and corrosion in duct work, plenums and turning vanes, which can cause flow maldistributions.

The second commenter maintains that EPA has not thoroughly investigated the ESP degradation issue in its NSPS review. They also say that the Agency has not considered the costs of major rebuilds or lost production due to unscheduled repairs in the C/E calculations.

Response: The problem of gradual deterioration of ESP performance was investigated during the NSPS development and again during the NSPS

review. During the NSPS development, the ESP vendors indicated that a properly maintained ESP should not deteriorate over the expected life of the unit. Problems encountered are usually due to operating the equipment at conditions for which it was not designed (i.e., higher gas volumes, higher inlet loadings, or lower inlet temperature). The main problem areas are corrosion and wire breakage.

The unit for which EPA obtained long-term particulate data, at the time it was installed, employed a new design which minimized wire breakage. This unit was tested by EPA as part of the data base for the NSPS. Additional data supplied by the State agency during the NSPS development indicated that the unit consistently achieved the NSPS level. During the NSPS review, the operator of this unit was again contacted to obtain information on maintenance costs and ESP performance. The maintenance costs for this unit had increased from 240 man-hours per year to an average of 913 manhours per year. These maintenance costs are higher than the estimate used by the Agency. If it could be shown that all of these costs are attributable to the NSPS, the incremental C/E of the NSPS is $200-$300 per ton, which is still reasonable. However, as noted, it is not clear that the increased maintenance costs are in fact due to the NSPS. The data indicated that after 10 years of operation, the unit was still capable of achieving the NSPS level. It is true, as the one commenter pointed out, that test data indicate that at times the unit has had emissions above the NSPS level. It must be pointed out, however, that this unit is not subject to the NSPS and is only required to achieve a State regulation which is double the NSPS level. Therefore, this unit is maintained to achieve the State level as opposed to the NSPS level. It

is the Agency's judgment that this unit could consistently achieve the NSPS if the frequency of maintenance were increased. The Agency's judgment is supported by the data supplied by one commenter which shows the performance of an ESP which is not subject to the NSPS but which is subject to a State standard about 25 percent lower than the NSPS. This latter unit has been operating for 10 years and has consistently achieved the NSPS levels.

The Agency's cost estimates do not include the cost of major rebuilds as was suggested by the commenters. The ESP's were widely used in the kraft pulp industry for recovery of process chemicals prior to establishment of NSPS and none of the information which has been reviewed indicates that major rebuilds are needed more frequently because of NSPS for PM. As a result of NSPS, new ESP's are designed with more plate area and additional maintenance costs for such items as replacement of broken wires would be expected. However, the need for major rebuilds, to repair corrosion damage, for example, is most likely attributable to process parameters, such as the flue gas temperature, and not related to the sizing of the ESP's. Since the NSPS do not affect the frequency of major rebuilds, it would be inappropriate to include the costs of rebuilds in the calculation of control costs.

2.3 SELECTION OF EMISSION LIMITS

2.3.1 Smelt Dissolving Tanks (SDT)

Comment (IV-D-5, 7, 8, 9, 10, 15, 18, 22, and 27): Five different commenters were in agreement with EPA's decision to raise the TRS standard for SDT. However, they said that the increase should be greater than the one which was proposed. One commenter said that preliminary data from a

new mill indicated that the proposed level needed to be doubled. In a follow-up letter, the commenter described the liquids being used in their scrubbers and noted that they planned to try and redirect sulfide-containing recycle streams from the SDT and scrubbers. In a third letter, the commenter said that efforts to modify their piping system to redirect sulfide bearing liquids away from the smelt tanks had been successful and that they had passed compliance tests. Thus, they withdrew their request for a higher TRS limit than that which was proposed.

A second commenter sent two letters describing experiences at two of its mills. The commenter said that selection of the scrubbing liquid is the only known method of modifying TRS emissions associated with smelt tank vent gases. The commenter has examined the use of alternative scrubbing liquids and said that TRS emissions exceeded the standard even when fresh water was used in the scrubbers at one of the mills. They said their best results at the other mill were obtained when both the smelt tank scrubber and the lime kiln mud washer showers were operated on fresh water, which the commenter considers an artificial condition for that particular mill. The commenter submitted additional continuous monitoring data and said the new data showed variations similar to those in previously submitted information.

A third commenter said the proposed TRS level is a move in the right direction, but that two of its facilities cannot meet that level on a consistent basis. The commenter said that various scrubbing media had been tried but that no controllable process or control technology operating conditions had been identified which could limit TRS emissions from smelt tank vents. This commenter said its data (from 50 hours of continuous monitoring) supported a TRS limit well above the proposed level. Two

comments by industry trade associations supported the first three commenters' observations and comments.

Response: Emissions of TRS compounds are governed by the concentration of reduced sulfur compounds either in the smelt from the recovery furnace or in the water in the smelt tank. Additional TRS may be introduced if liquids contaminated with TRS compounds are introduced to the scrubbers used for control of PM. There is no means of controlling the introduction of reduced sulfur compounds via the smelt from the recovery furnace. However, the introduction of additional TRS compounds to the vent gases can be prevented, or substantially reduced, by the selection of liquids to be used in the tanks and scrubbers. Preventing the introduction of TRS-contaminated liquids to the SDT system is the basis of best demonstrated technology (BDT), which is, "to use a liquid that is low in sulfides and TRS compounds--such as fresh water or recycled water from the lime mud washer--in the smelt tank and particulate control device" (49 FR 2448). The data base used in the review to revise NSPS for TRS from 0.0084 g/kg of black liquor solids (g/kg BLS) to 0.016 g/kg BLS includes two test reports from one mill which failed to comply with the 0.0084 g/kg BLS emission limit. The operators of the mill indicated that they had used fresh water in their mud washers and that the weak wash had been used in both the smelt tank and scrubbers. Use of these types of liquids is considered to be BDT for reducing TRS emissions. They then experimented with various liquids in the scrubber, including fresh water. Since no reasons for the higher TRS emissions could be identified, and since the sources were applying BDT, the emission limit for TRS emissions was proposed to be raised to 0.016 g/kg BLS to reflect the results of these compliance tests.

Information supplied by the first commenter showed that relatively small flows of TRS-contaminated recycle streams were being introduced to the weak wash storage tanks and subsequently to the SDT's and scrubbers. The operators of the mill were reluctant to remove the recycle streams because they did not want to increase either water usage or the amount of wastewater to be treated. When the mill used BDT and removed the TRS contaminated liquids from the smelt dissolving system, they did pass tests for compliance with the current TRS standard. After passing the test, the commenter withdrew his initial comment that the TRS limit should be greater than 0.016 g/kg BLS.

The data supplied by the second commenter for one of their mills showed that they had been using contaminated condensate in their SDT scrubber recycle system. When the condensate was replaced with fresh water, TRS emissions began to drop. Later data from the same source showed that use of boiler blowdown (which is very low in residual sulfides) in the system reduced TRS emissions to NSPS levels. The commenter said that the best results were obtained when lime mud shower (which produces the weak wash used in the SDT) and SDT scrubber were operated on fresh water, but that this represents an artificial condition established solely to minimize TRS emissions. They say that operating in this manner causes an unusually high hydraulic loading on the effluent treatment system. The artificial condition described for the plant is what the Agency considers to be BDT. While the plant may not operate this way now, the Agency has concluded that using fresh water, or other liquids low in TRS compounds, to reduce TRS emissions is technically feasible and reasonable from a cost standpoint. The Agency continues to believe that if BDT is implemented, the TRS limit of 0.016 g TRS/kg BLS can be met.

The EPA disagrees with the second commenter's statement that selection of scrubbing liquid is the only known method of modifying TRS emissions associated with SDT vent gases. The mill which they were discussing had problems with excess TRS emissions and began testing different scrubbing liquids. Initially, they had been using weak white liquor, which is known to remove some polar compounds, such as H_2S. Thus, it is not surprising that TRS emissions increased when water, and various other liquids were substituted. However, the scrubber was installed for removal of PM, not TRS. The key point is that BDT for TRS is aimed at preventing introduction of TRS to vent gases by the dissolving liquid or scrubbing medium.

Both the second and third commenters said that the ranges in their TRS monitoring data were indicative that the proposed standard cannot be met on a consistent basis. The third commenter did not submit enough information for the Agency to draw any conclusions. It is noted that the two tanks to which they referred are not subject to NSPS and the comment letter suggested that water used in the SDT was not of the quality required by BDT. The second commenter's data showed variation in TRS concentrations for individual samples, but when the data points were averaged, as they would be for a compliance test report, the emission levels were below the proposed TRS limitations.

Comment (IV-D-4, 11): Two commenters object to relaxing the existing TRS standard for SDT because of one or two failures to achieve compliance. One commenter suggests an alternative of allowing exemptions based upon site-specific studies and a requirement that Best Available Control Technology be employed.

Response: These suggestions are inconsistent with the basis of the NSPS. An emission limit must be set at such a level that any facility which employs BDT can achieve that emission level during a performance test. A facility which was employing BDT failed two performance tests. In selecting an emission limit, variability of available test data must be taken into consideration. The Agency proposed to revise the TRS standard from 0.0084 g/kg BLS to 0.016 g/kg BLS in order to reflect the observed performance of BDT.

The TRS compounds may be introduced to the vent gases by the molten smelt, the water in the smelt tank or the liquid used in the particulate scrubbing device. There is no means of controlling the amount of TRS introduced by the smelt and there is no BDT for removing TRS from SDT vent gases. However, the sulfide content of the water used in the SDT and scrubber may be readily controlled and this is the basis for the BDT. Hence, BDT for controlling TRS emissions from SDT is to use a liquid that is low in sulfides, such as fresh water or recycled water from the lime mud washer, in the SDT and scrubber.

2.3.2 Lime Kilns

Comment (IV-D-4): One commenter suggested that the standard for PM should be made more stringent. The commenter said that EPA should give further consideration to requiring ESP's in series with venturi scrubbers and that the $3,200 per ton cost estimate is not out of line with the typical cost range for NSPS controls quoted in the text.

Response: The C/E of an ESP in series with a scrubber to which the commenter refers was calculated based on cost estimates generated when the current NSPS was developed. The $3,200/ton C/E estimate is for an oil-fired lime kiln. Kilns subject to the NSPS are generally designed

to fire both gas and oil. However, most of those kilns subject to NSPS which were designed for both fuels are fired on natural gas. The C/E for an ESP on a kiln firing gas is estimated at about $8,500/ton. This is because of the lower incremental emission reduction achieved by the addition of an ESP when gas is fired. The NSPS for gas-fired kilns is half the level for oil-fired kilns. Therefore, the C/E for any individual lime kiln could vary between $3,200 and $8,500/ton depending on the percent of time gas is fired in the kiln. Since the incremental C/E would be higher than $3,200/ton in most cases, the Agency feels that it would be unreasonable for the NSPS to require ESP's in series with scrubbers.

Comment (IV-D-8, 9, 10, 16, 19, and 20): Five different commenters suggest the current TRS standard for lime kilns needs to be revised to reflect the results of continuous monitoring. One commenter says the monitoring data from two of its NSPS facilities indicate that the standard needs to be revised to allow for exceedance of the TRS limit 3 percent of the reporting time to allow for normal variations in operating conditions. The commenter lists four factors which can influence TRS emissions from the kiln stack: (1) kiln firing conditions; (2) treatment of noncondensable gases; (3) source of water used at the particulate scrubber; and (4) porosity of the mud at the filter (which controls oxidation of the residual sulfide content). This commenter stated that TRS emissions associated with the first three factors are straightforward and the control options are understood, but that the control of mud porosity at the filter is not completely understood.

One commenter stated the opinion that the current TRS standard can be met when the kiln and associated systems are operating normally, but that the nature of the process is such that unavoidable irregularities

which can affect TRS emissions will occur 10 percent or less of the total operating time. He says that short-term "blips" or "spikes" are adequately reckoned by the averaging time, but that a 4 percent allowance for excess emissions appears reasonable for those infrequent, medium-term TRS excursions which are beyond the control of the operators. The commenter says he is unaware of any evidence that the use of caustic soda (to control excess emissions) is effective and/or cost effective. He also doubts that lime mud oxidation is a cost effective technique for controlling excess TRS emissions.

One commenter has been unable to explain variations in data from a certified continuous monitoring system. The commenter stated that 12-hour averages from this particular facility range from 2 to 30 ppm TRS and the commenter is concerned that it may not be possible to meet the 8 ppm limit continuously.

One commenter says that as more TRS monitoring systems come on-line, there will be additional information which will be useful in determining whether or not the current standard is appropriate. The commenter suggests that EPA should evaluate available continuous monitoring data from lime kilns equipped with wet scrubbers before making any final decisions on an NSPS.

Response: Many of the comments were prompted by the requirement that lime kilns subject to the NSPS install and operate continuous emission monitors (CEM's) to measure TRS emission by July 20, 1984. After considering the comments, the Agency determined that it would be appropriate to obtain additional data. Subsequently, the first 6 months' CEM data for all 19 lime kilns subject to NSPS were requested along with associated operational data and design parameters for the lime kilns and lime mud

washing systems. The Agency has received additional information for 14 of the 19 lime kilns subject to the NSPS. Of the 14 submitting data, 3 were judged to be using BDT and had CEM data which were accompanied by information needed to ascertain the accuracy of the certification reports. The data from these 3 facilities indicate that the NSPS can be achieved when BDT is implemented.

During the data period, one of the three mills had only one excess emission and the excursion occurred when the addition of caustic was discontinued for testing of the CEM. A second mill, which previously achieved the NSPS TRS limit a high percentage of the time through good mud washing and process control, began using caustic in recent months. The most recent excess emission reports show no excess emissions. The Agency considers this information to be indicative that caustic addition reduces excess TRS emissions.

Approximately half of the remaining data could not be used in making a decision because either data needed to determine if the CEM's had been properly certified was missing or the information provided showed that the CEM's had histories indicative of maintenance problems. The data from the rest of the mills were suggestive of failure to follow all of the practices which constitute BDT.

In general, long-term CEM and operational data for NSPS lime kilns show that the ability to reliably operate CEM's and use the CEM's for process control plays a central role in the achievement of the NSPS and that such ability is learned over time. The industry continues to believe it is possible in some cases that, even with experience and the use of BDT, there could continue to be periods of excess emissions. Although such a possibility may not be ruled out, the Agency has not received any

data which would indicate that such is the case. The Agency expects that, as the operators of these facilities learn to use their CEM's to aid in controlling their processes, the periods of excess emissions should be significantly reduced when BDT is fully implemented.

Industry representatives have expressed concern that reported excess emissions may be construed as violations of the Clean Air Act. Compliance or non-compliance with the Act is determined by performance testing. A detailed description of the Agency's intended use of CEM data was previously published in the Federal Register (43 FR 7568). The overall intent of the requirement to continuously monitor TRS emissions is to provide enforcement agencies with an instrument to determine that BDT has been implemented and is being practiced.

Comment (IV-D-6 and 10): Two comments were received concerning the lime kiln controlled with an ESP which was described in the Proposed Rules. The commenters emphasized the uniqueness of this particular facility, at which an ESP was installed to meet local and State particulate limits which are site specific, and that an exemption should be granted for this facility. One commenter requested that the NSPS TRS limit be revised to require this particular facility to meet a TRS emission limit of 20 ppm corrected to 10 percent oxygen, on a 12-hour basis, and not to be exceeded more than 2 percent of the time on a quarterly basis. The commenter also said that the stack gases from the ESP would disperse better than those from a venturi scrubber because the gases from the ESP are approximately 180° hotter.

Response: The Agency has reviewed information on the lime kiln which is controlled with an ESP instead of a wet scrubber. Information reviewed

by the Agency suggests that this particular facility can control TRS emissions to NSPS levels by making additional improvements in process controls and by raising the temperature of the cold end of the lime kiln by 100° F. During the review, the costs of implementing BDT were reexamined. These costs included the costs to increase cold-end temperatures, and the Agency continues to believe these costs are reasonable.

2.4 TEST METHODS AND MONITORING

2.4.1 Temperature Monitoring Requirements

Comments (IV-D-5, 8, 9, and 11): Four commenters favor the proposed elimination of temperature monitoring requirements for lime kilns, power boilers, and recovery furnaces. One commenter voiced agreement with the decision to retain the temperature monitoring requirement for TRS incinerators because they believe that these records can reveal excessive control equipment downtime.

Response: None required.

Comment (IV-D-4): One commenter opposes the elimination of any temperature monitoring requirements because they consider such requirements to be a low-cost item which will ensure proper combustion of TRS emissions.

Response: The Agency proposed to eliminate temperature monitoring requirements for power boilers, recovery furnaces, and lime kilns. The basis of the proposal is that the flame temperatures and residence times at which these facilities are expected to operate exceed the 1200° F and 1/2 second considered necessary for adequate incineration of TRS emissions. The Agency also noted that implementation of requirements for continuous

monitoring of TRS emissions from recovery furnace systems and lime kilns provides additional justification for eliminating temperature monitoring requirements for these sources. Further, prevention of energy waste and of fouling of heat transfer surfaces in power boilers is sufficient incentive for the owners of these facilities to properly operate and maintain them. Therefore, the Agency considers temperature monitoring requirements to be unnecessary.

2.4.2 Revised Units for Smelt Tank TRS Compliance Calculations

Comment (IV-D-8 and 11): Two commenters support the proposed revision of the units of the TRS standard for smelt tanks. One of the commenters suggests that a source which fails the performance test using Method 16A should be required to retest using Method 16 because the latter procedure provides more information as to why the source failed the test.

Response: It is the option of the source owner to test using the Method 16 gas chromatographic procedure and only quantify hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. If the source owner chooses to use Method 16A, which measures all sulfur compounds except SO_2, and fails the performance test, the owner would presumably re-test using Method 16. Therefore, it is not necessary to provide this in the regulation.

2.4.3 Determination of Compliance with TRS Standards

Comment (IV-D-12): One commenter noted the need to correct the formula for calculation of the TRS emission rate as given in Section 60.28S(d)(3) of the NSPS for Kraft Pulp Mills which was promulgated on February 23, 1978. When English units are used in the formula as it was published, the resulting value of "E" is 500 times too large.

Response: The commenter is correct. A corrected formula was printed in the Federal Register on March 8, 1985 (50 FR 9578) and on May 6, 1985 (50 FR 19022).

2.5 REPORTING AND RECORDKEEPING

Comment (IV-D-5, 8, and 9): Three commenters favor the proposal to change the frequency of excess emissions reporting from quarterly to semi-annually.

Response: None required.

Comment (IV-D-4 and 11): Two commenters oppose the proposed change in the reporting period. One commenter says the current requirement imposes little burden on industry but provides significant improvement in the data base used by controlling agencies. One commenter says that the proposed change would make any response to excessive emissions more difficult.

Response: The proposed change in the reporting period will affect neither the data base nor the usefulness of the data for identifying periods of excess emissions. For example, continuous monitoring of TRS emissions from recovery furnaces and lime kilns is required. Twelve (12) hour average TRS concentrations (2 per day) must be calculated and recorded. The proposed change in the reporting period would have no effect whatsoever on these requirements and, thus, the data base will not be affected. Also, the data which is gathered is not used to determine compliance with the regulations. Rather, the data is used as an indicator of good process operation and as a possible indicator of the need for compliance testing. Although the Agency will receive data less often, we believe that semi-annual reporting will be sufficient to insure proper operation and maintenance.

2.6 MISCELLANEOUS

Comment (IV-D-10): One commenter made the following remarks regarding the timeliness of the current procedures for reviewing NSPS: "New technologies with significant potential for reduced emissions and energy consumption as compared to conventional technologies are constantly under development and may be ready for full-scale commercial application at any time. However, several years typically elapse between EPA reviews of the NSPS for a particular industry. Since existing NSPS may or may not be appropriate for a given new technology, there is an urgent need for timely EPA review and evaluation of new technologies as they come on-line. Appropriate revisions to the NSPS should be made in an expeditious manner to accommodate new technologies; EPA should not wait until the normally scheduled periodic NSPS review is conducted." The commenter feels that the NSPS should not be an impediment to the installation of new and/or lower emitting technologies.

Response: The NSPS do not require that operators of a facility install a specific technology. Instead, the standards establish emission limits which are achievable by the BDT. An operator is free to install and operate any technologies if emissions do not exceed the limitations of the applicable standards. An individual wishing to install an innovative technological system, one which has not yet been adequately demonstrated, may request a waiver under the provisions contained in Section 111(j) of the Clean Air Act.

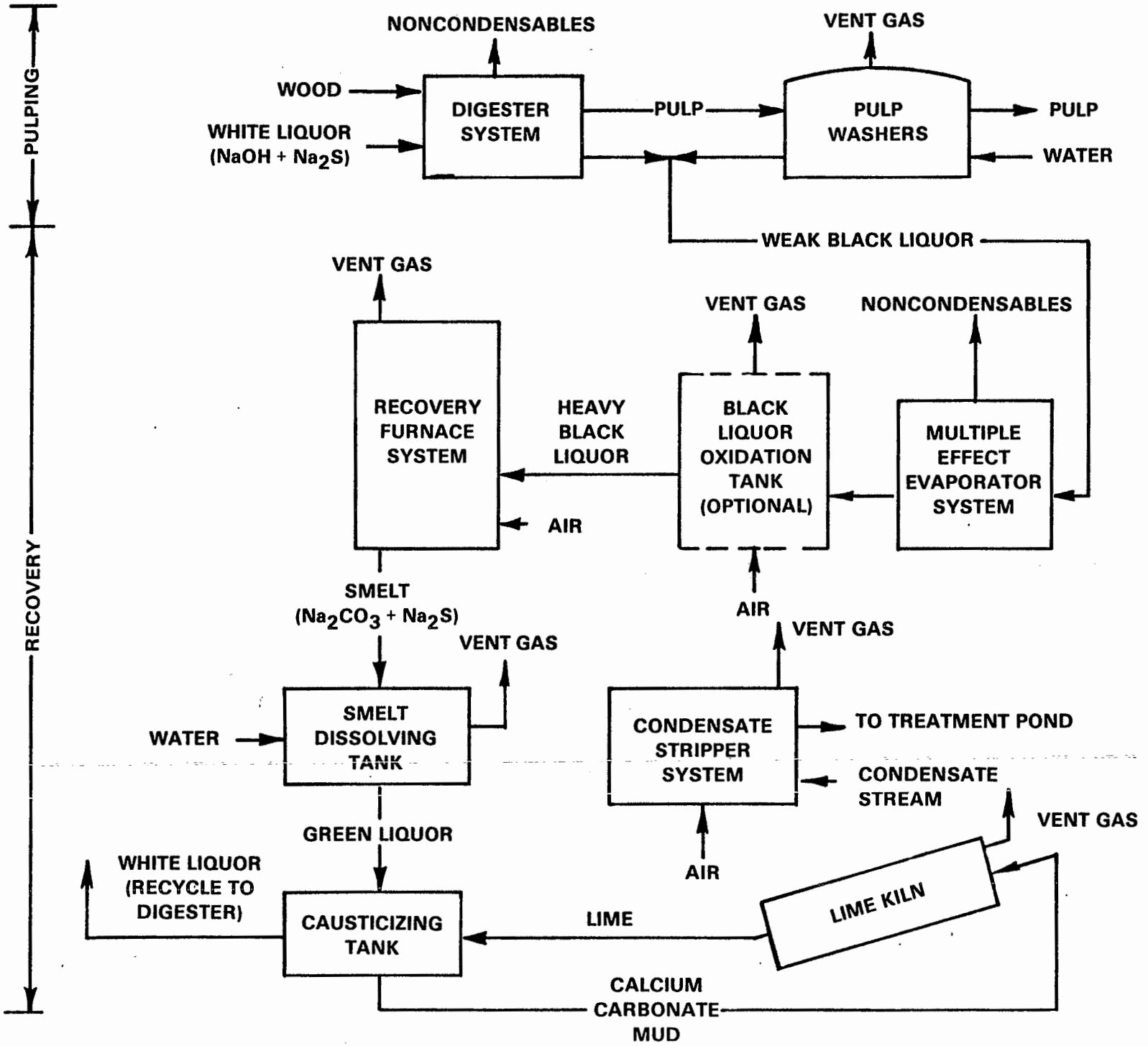
In those instances where major changes within an industry occur between 4-year reviews, the industry may request that a special review of NSPS be conducted if the need to do so can be demonstrated to the Agency.

Comment (IV-D-9): One commenter remarked that the EPA proposal to allow the owner of a kraft pulp mill to select the control process for

TRS emissions, so long as the 5 ppm TRS limit is met, for digester systems, brownstock washer systems, and condensate strippers is a reasonable position. This commenter notes that the owners of these facilities have both the economic incentive and the expertise to comply with applicable regulations.

Response: None required.

APPENDIX A



KRAFT PULPING PROCESS

APPENDIX A

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-450/3-85-020		

4. TITLE AND SUBTITLE	5. REPORT DATE
Kraft Pulp Mills--Background Information for Promulgated Revisions to Standards	August 1985
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Office of Air Quality Planning and Standards U.S. Environmental Protection Agency Research Triangle Park, North Carolina 27711	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS DAA for Air Quality Planning and Standards Office of Air and Radiation U.S. Environmental Protection Agency Research Triangle Park, North Carolina 27711	13. TYPE OF REPORT AND PERIOD COVERED
	14. SPONSORING AGENCY CODE EPA/200/04

15. SUPPLEMENTARY NOTES

16. ABSTRACT

As a result of the 4-year review of New Source Performance Standards (NSPS) for Kraft Pulp Mills, the Agency proposed revisions to the NSPS, which were promulgated on February 23, 1978, and requested public comments. This document summarizes the comments which were received and presents the Agency's response to those comments.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Kraft Pulp Mills Particulate Matter Total Reduced Sulfur Standards of Performance Pollution Control	Air Pollution Control	13 B

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release Unlimited	Unclassified	37
	20. SECURITY CLASS *(This page)* Unclassified	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE